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10/594,333

09/27/2006

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EXAMINER

SUMMONS, BARBARA

ART UNIT

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2817

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|----------------------------------------|--|
| Office Action Summary | Application No. 10/594,333 | Applicant(s) FURIHATA ET AL. | |
| | Examiner BARBARA SUMMONS | Art Unit 2817 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2006 (pre-amend.).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 9 and 11 is/are rejected.
- 7) ☒ Claim(s) 3-8 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/27/06 & 12/7/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figures 3A and 3B should be designated by a legend such as - -Prior Art - - because only that which is old is illustrated (see e.g. the substitute specification page 1, lines 16-25 and page 2, lines 13-16). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The substitute specification filed 09/27/2006 has been approved and entered.

Claim Rejections - 35 USC § 102/103

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 9 and 11 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Kadota U.S. 6,663,943.

Regarding claims 1 and 9, Fig. 1 of Kadota discloses a surface acoustic wave (SAW) device (see e.g. the Title) comprising: a SAW element 10 having a first surface on which an excitation portion and including an electrode/pad electrode is formed (not shown but see e.g. col. 2, lines 32-37); a mounting substrate 1 having an electrode/pad electrode 4,5 on a surface and disposed facing the first surface with a gap of a predetermined distance therebetween thereby securing a vibration space for the SAW excitation portion; a bump 11,12 (see Figs. 2A-E) for coupling the electrode on the SAW element and the electrode 4,5 on the mounting substrate 1 to each other (see col. 4, line 61 to col. 5, line 5); and a sealing resin having at least three layers is formed on the mounting substrate so as to cover the SAW element 10; wherein the sealing resin comprises a first sealing resin 13 that is a flexible resin of e.g. silicone gel (see col. 5,

Art Unit: 2817

lines 20-22) surrounding the SAW element 10 and covering the rear and side surfaces of the SAW element and the mounting substrate 1 at a periphery of the SAW element, a second harder sealing resin 14 of e.g. epoxy resin or glass-epoxy resin (see col. 5, lines 54-57) covering at least the first resin 13, and a third moisture resistant resin 16 of e.g. polyimide resin (see col. 6, lines 10-15) covering at least the second resin 14; and wherein an elastic modulus of the various materials is merely an inherent physical property of the material with the first silicone gel resin having an elastic modulus of about 0-400 psi (see other art of record, the C.P. Wong et al. article, cited below as evidence), the second epoxy resin's elastic modulus is about $1-5 \times 10^6$ psi, and the third polyimide resin's elastic modulus is about 1×10^6 psi, such that the elastic modulus of the third polyimide resin is inherently higher than that of the first silicon gel resin, and is lower than that of the second epoxy resin for at least epoxy resins with $2-5 \times 10^6$ psi. Regarding claim 11, note that using any conversion calculator that can be found online, the third polyimide resin with an elastic modulus of 1×10^6 psi converts to 6.895 GPa which is in the recited range.

The § 103 portion of the rejection is being included because there is a range of elastic modulus for the second resin layer 14 epoxy resin encapsulants (i.e. $1-5 \times 10^6$ psi), dependent upon the specific epoxy resin chosen, and while polyimide resin inherently has an elastic modulus lower than most of the range of that for the epoxy resins, Kadota does not explicitly disclose using a second epoxy resin with an elastic modulus higher than that of the third polyimide resin layer 16 (i.e. with 1×10^6 psi). However, Kadota does explicitly disclose the physical parameters desired by the three

Art Unit: 2817

resin layers being the first silicon gel resin layer being flexible, the second epoxy resin layer being harder than the first silicon gel resin layer, and the third polyimide resin layer being more moisture resistant than the second epoxy resin layer.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW device of Kadota (Fig. 1), if even necessary (i.e. the elastic modulus of the third polyimide resin layer 16 may already be lower than that of the second epoxy resin layer 14), such that the third polyimide resin with a modulus of elasticity of about 1×10^6 psi would have been lower than the modulus of elasticity of the second epoxy resin layer that is about $1-5 \times 10^6$ psi, because such an obvious modification would have been the mere substitution of art recognized alternative resin layers easily chosen by those of ordinary skill in the art based on the other physical requirements of the materials explicitly suggested by Kadota being flexibility of the first layer (see col. 5, line 20-22), hardness of the second layer (see col. 5, lines 54-57) and higher moisture resistance of the third layer vs. the second layer (see col. 6, lines 10-15). Furthermore, based on the range of modulus of elasticity of epoxy resin, it would have been known that the third polyimide resin layer with elastic modulus of 1×10^6 psi would inherently have a lower elastic modulus than at least about 80% of the epoxy resins at $1-5 \times 10^6$ psi.

Allowable Subject Matter

6. Claims 3-8 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The C.P Wong et al. article, "Understanding the Use of Silicone Gels for Non-Hermetic Plastic Packaging" is provided as evidence because it discloses inherent physical parameters of resins used as encapsulants (see Figs. 1 and 2) including the modulus of elasticity thereof.

Hara et al. U.S. 2004/0213973 is an English language equivalent of JP 2004-327623 which was cited by Applicants.

Furukawa et al. U.S. 6,262,513 discloses a device sealed with two layers (see e.g. Fig. 16); and Furukawa U.S. 6,914,367 shows a SAW device sealed with three layers 7, 8 and 22 (Fig. 7), however some of the layers are metal not resin.

Gotoh et al. U.S. 6,417,026 shows a SAW device sealed with two layers (Fig. 1).

Kim et al. U.S. 6,928,719 shows a SAW device sealed with three layers 16, 20 and 22 (Figs. 2c-e), but one layer 20 is metal not resin.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BARBARA SUMMONS whose telephone number is (571)272-1771. The examiner can normally be reached on M-Thu, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2817

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs
September 10, 2008

/Barbara Summons/
Primary Examiner, Art Unit 2817